US Army Corps of Engineers

ENGINEERING AND CONSTRUCTION BULLETIN

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Subject: Vinyl Sheet Piling

Applicability: Guidance

1. Reference EM 1110-2-2504, 31 Mar 94, Design of Sheet Pile Walls

2. Designers are being presented with the option of utilizing vinyl sheet piling on Corps projects. Paragraph 2-4(6) of the referenced EM discusses briefly the availability of this product for use on Corps projects and basically states that material properties must be obtained from the manufacturer and must be carefully evaluated by the designer for each application. This guidance is leading some designers to use vinyl sheet piling in some applications considered high risk because of the economy that such pilings have over steel sheet piling. The designer should carefully consider the following concerns before selecting vinyl sheet piling.

a. Use of Vinyl Sheet Piling—Questions have been raised concerning the integrity of vinyl sheet piles for critical applications. Because of these uncertainties discussed, vinyl sheet piling should not be used when life safety and widespread property damage are at stake in the event of failure. This would apply to projects where vinyl sheet piling is providing the main line of flood or hurricane protection. Vinyl sheet piling had been used as a seepage cutoff when the designer can ensure that driving conditions are such that the sheet pile interlocks will not be damaged.

b. Durability—Concern about vinyl sheet piling relates to how long it will last without becoming brittle. Cold weather and ultraviolet rays are two environmental factors that can reduce the life expectancy of vinyl sheet piling. Manufacturers who state that their product will last 50 years should corroborate the accuracy of such claims with independent testing and evaluation and provide a specification for vinyl sheet piling that meets USACE requirements. Manufacturers may provide a 50-year warranty, but if a warranty will actually cover damages caused by the environment is questionable. Replacement of damaged piles should be done as soon as possible in order not to adversely affect the integrity of the protection.

c. Damages from Impact, Excessive Heat and Vandalism—Vinyl sheet piling can be damaged by impact and excessive heat. As a result, accidents, sabotage and vandalism are of concern. Local sponsors should be provided replacement sheets for piles that are damaged and have a consistent and dependable maintenance program to always insure the integrity of the protection.

d. Material Standards, Serviceability, Interlock Strengths, Fatigue, Effects of Ambient Temperature, and Geometrical Shapes—There are no national consensus industry standards for material serviceability requirements such as minimum thickness; interlock configurations and minimum strengths of the interlock considering drivability without coming out of interlock; fatigue life due to cyclic loading; effects of ambient temperature, both hot and cold, on deflection and performance; and analytical guidance considering the various geometrical piling shapes that manufacturers offer and any inherent structural internal instability associated with the shapes that would have to be accounted for in the design. The designer needs to exercise appropriate caution in addressing these concerns before selection of a product.

e. Design Allowable Stresses—There are no national consensus industry standards for the level of allowable stresses that should be used for vinyl sheet piling. Manufacturers and the Corps have conducted limited tests to determine the strength of vinyl sheet piling. Additional investigations should be made to determine if creep will affect vinyl sheet piling and to determine the allowable stress that the designer considers appropriate for flood protection. Until standards are available, the designer should assure that a significant factor of safety is available for those situations where vinyl sheet piling should be considered appropriate.

3. Use of vinyl sheet piling should be based on potential cost savings and should always provide a quality design that is safe and will last for the life of the project. EM 1110-2-2504, Design of Sheet Pile Walls, will be updated to furnish design guidance and guide specifications appropriate for use. In the meantime, vinyl sheet piling should not be used in applications where life safety and widespread property damage are at stake in the event of failure.

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